

The current and future sociohydrological role of traditional irrigation system in high mountain areas in Southern Spain

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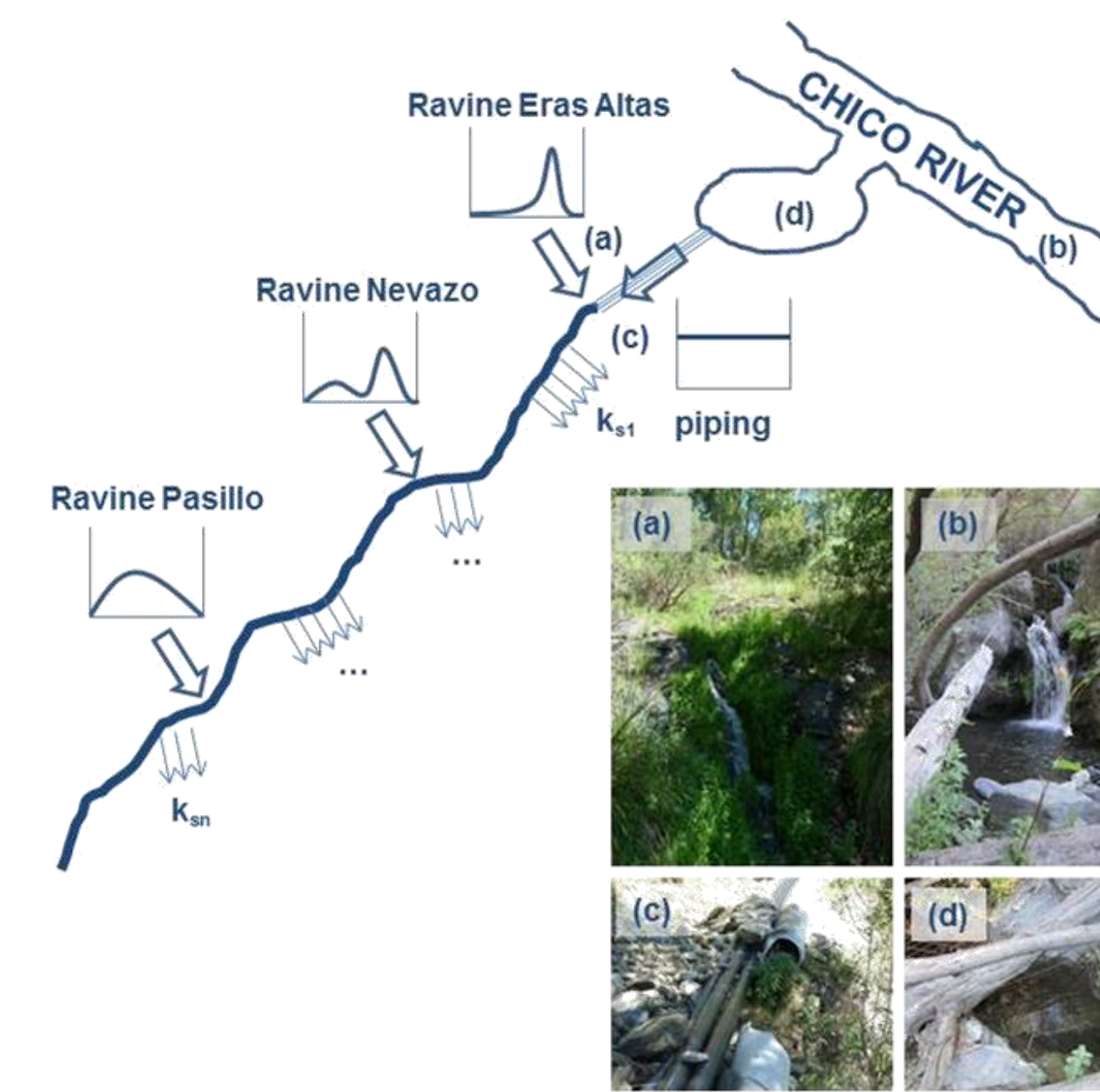
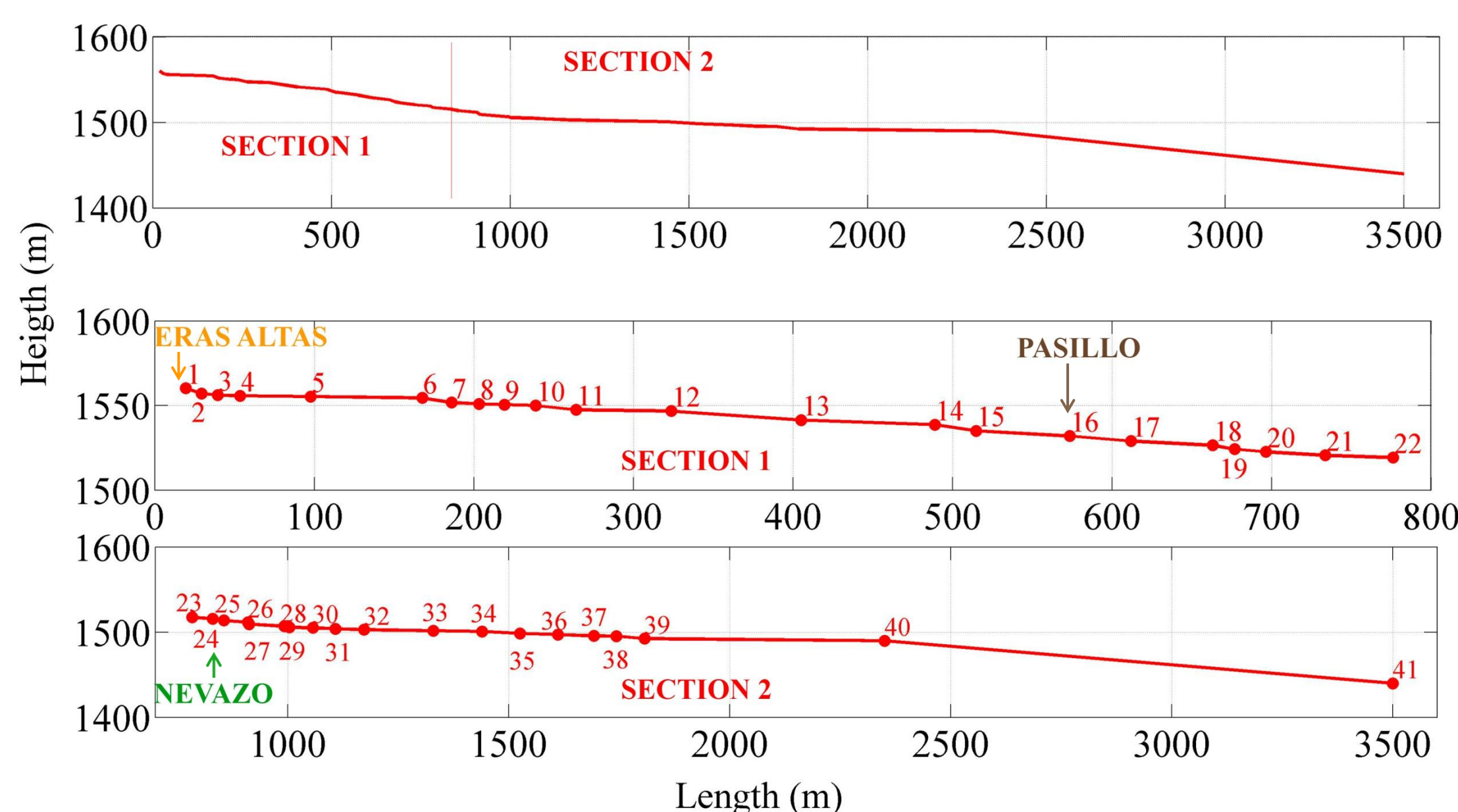
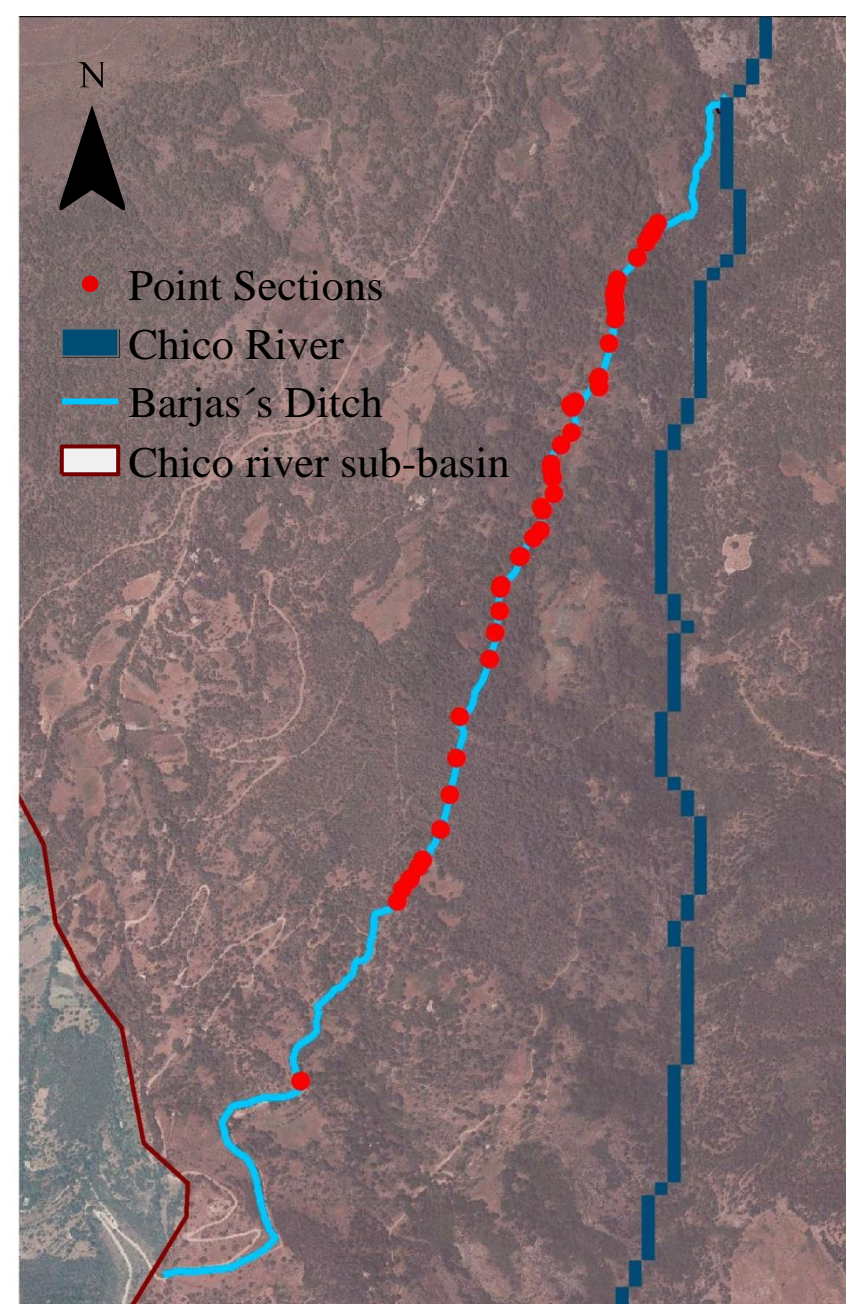
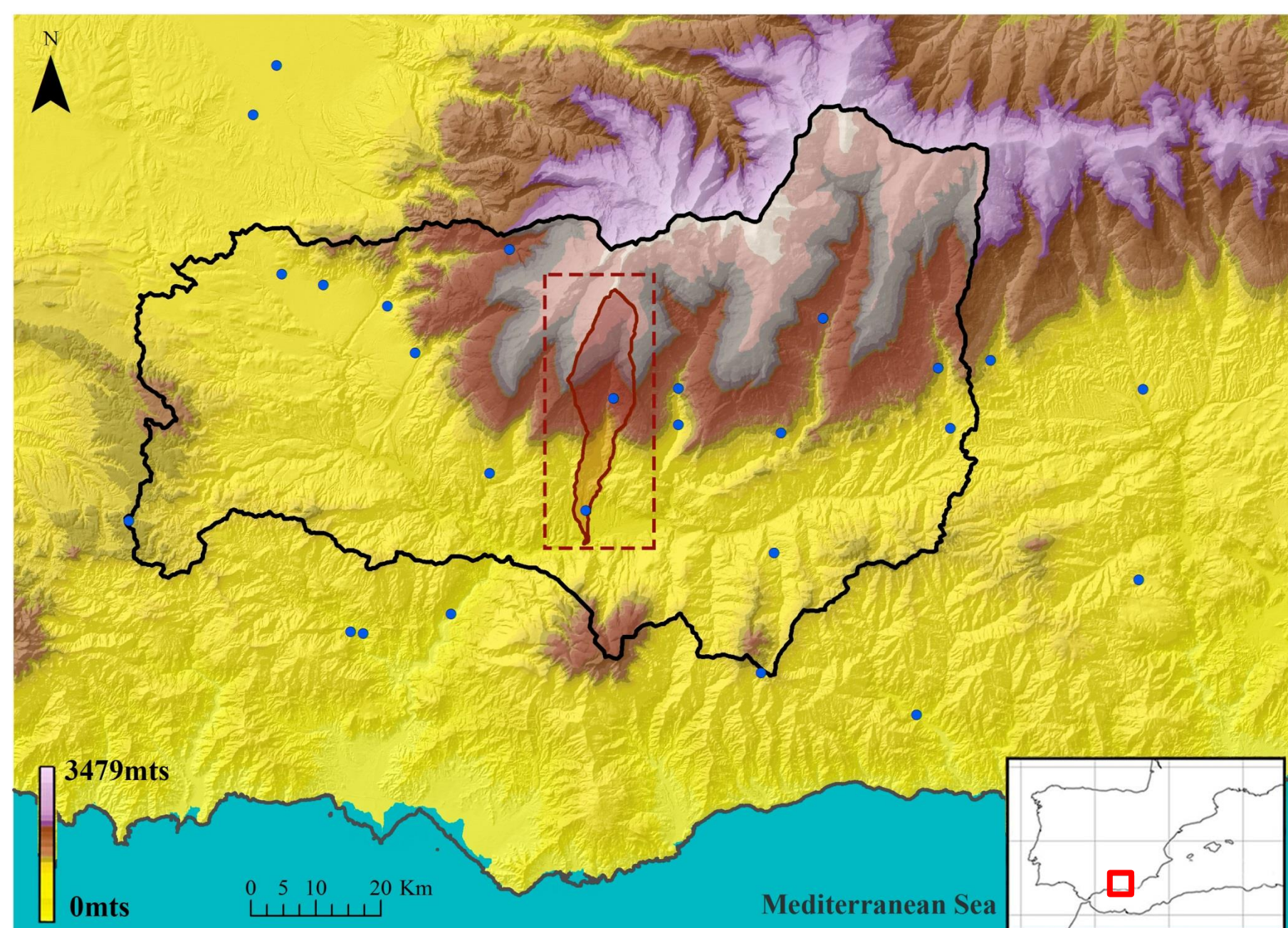
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INTRODUCTION

In **Mediterranean mountain regions**, **traditional irrigation systems** persist in areas where the standard modernization approaches do not succeed in being operational. In many cases, these actions have been **changing** the hydrological natural regime, soil uses, vegetation distribution for centuries, and they are part of the **social structure and cultural heritage** of such regions. In Sierra Nevada mountains in Southern Spain the old irrigation/recharge channels dating from the Arabs (Xth Century) are still operational in some areas; they contribute to maintaining local agricultural systems and population in basins dominated by snow conditions, and constitute a traditional regulation of water resources in the area. **This work shows the spatial distribution and current state of the channel systems and water uses, and their sociohydrological and ecological role, in this area.**

TRADITIONAL IRRIGATION SYSTEM: BARJAS'S DITCH



The traditional irrigation system selected is Barjas's ditch, in the Alpujarras region (southern Sierra Nevada Mountains, Spain). It flows like an open channel system along 3,5 km at 1573 m.a.s.l. over the Chico River sub-basin (31 km²) with a mean slope of 0.0023 mm⁻¹. Barjas's ditch takes water from the Chico River using two pipes. Moreover, it has some water contributions from three different ravines (Eras Altas, Nevazo and Pasillo) located along its way.

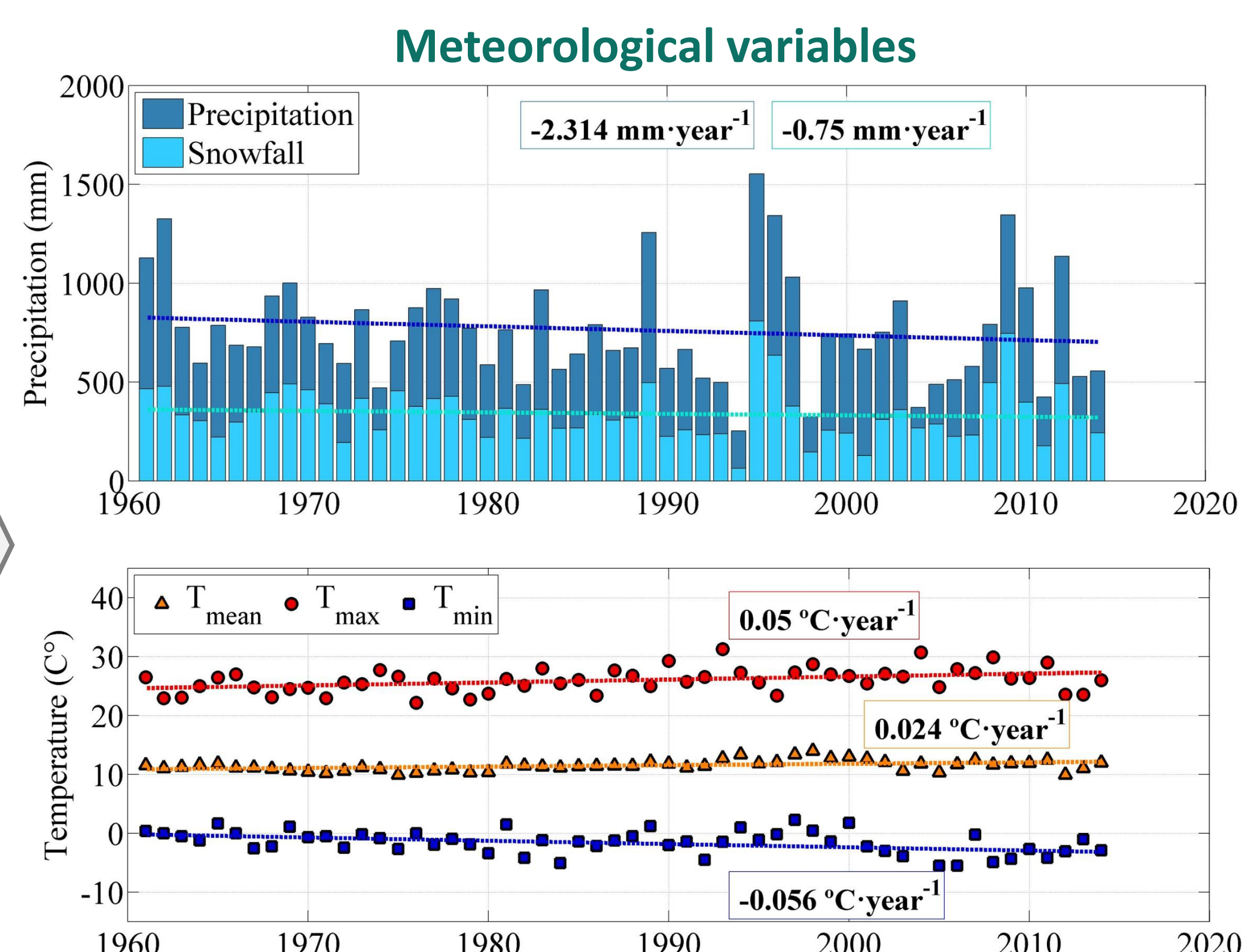
METHODOLOGY

RESULTS

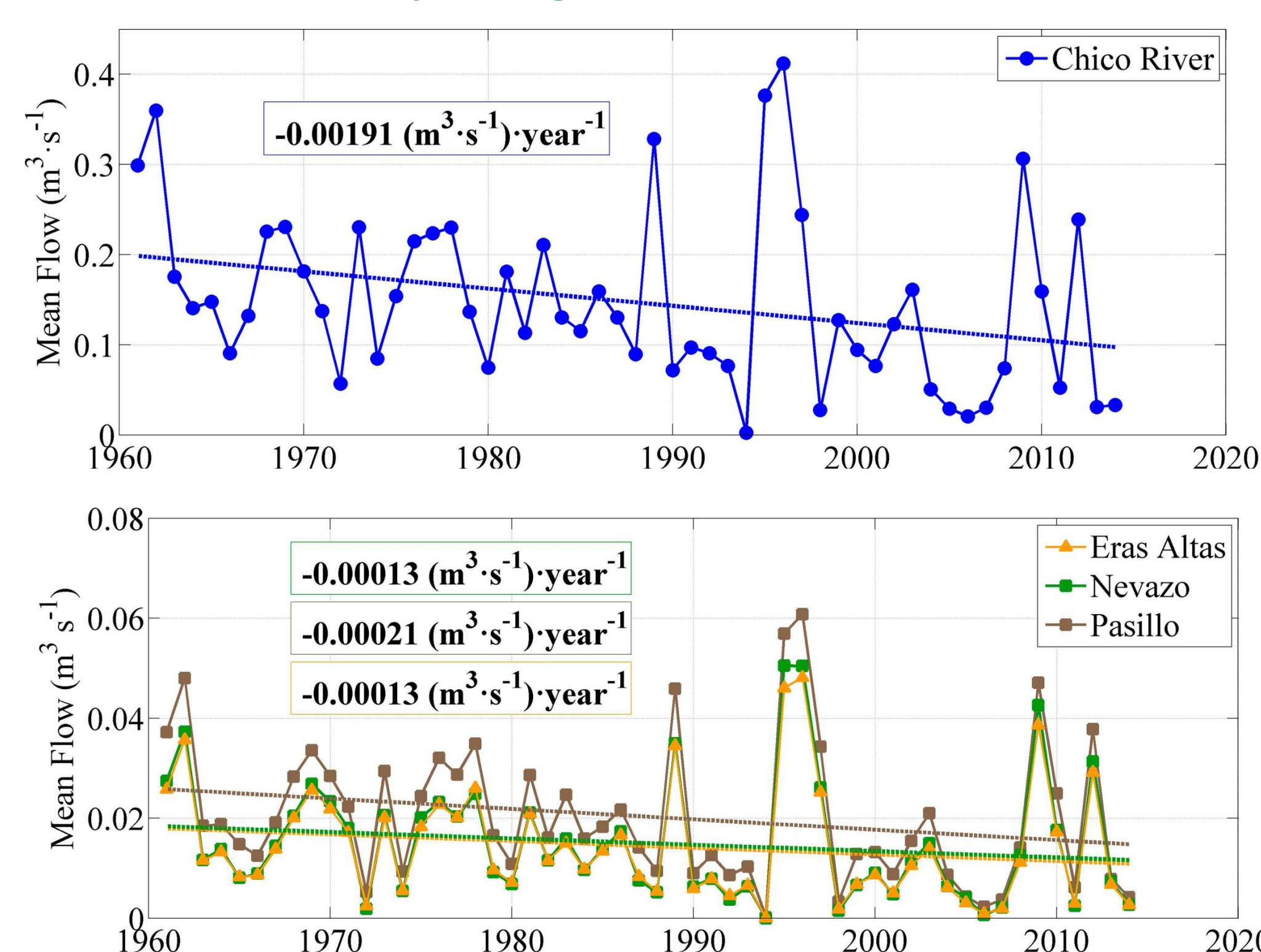
Hydrological Modelling
(WiMMed, Watershed Integrated Model for Mediterranean regions) Distributed physically based hydrologic model with a specific snow module.



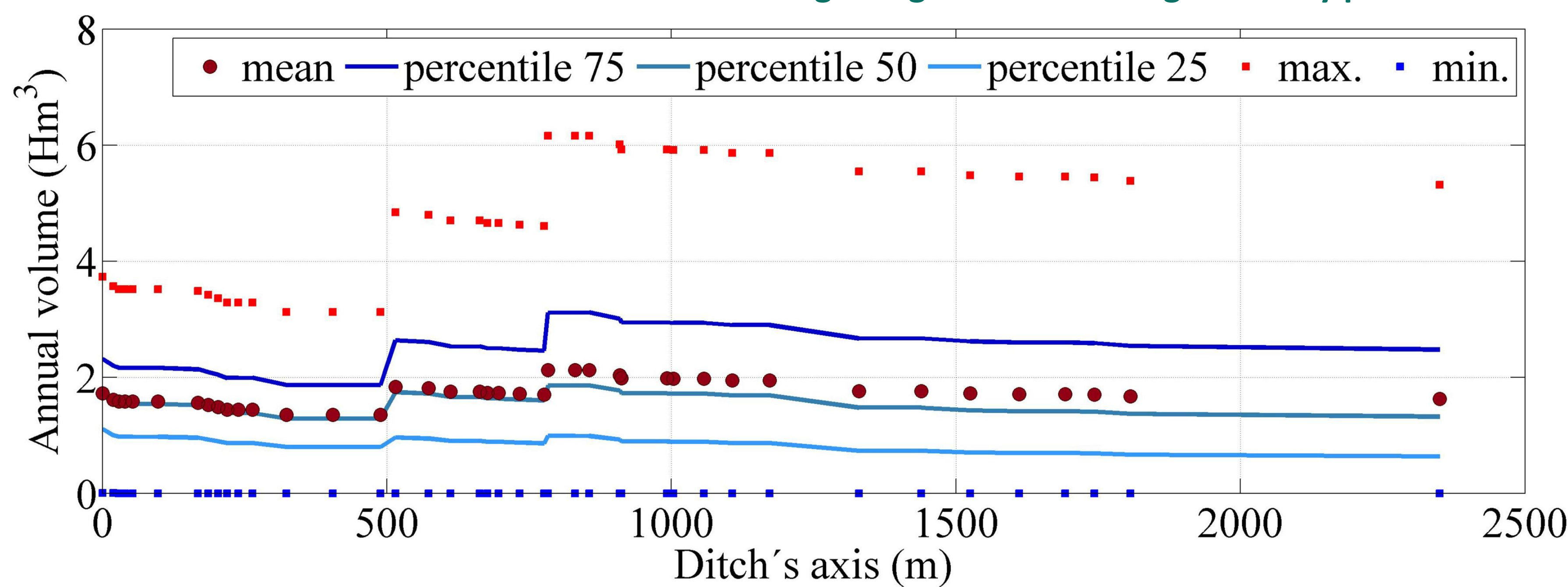
Meteorological and flow variables



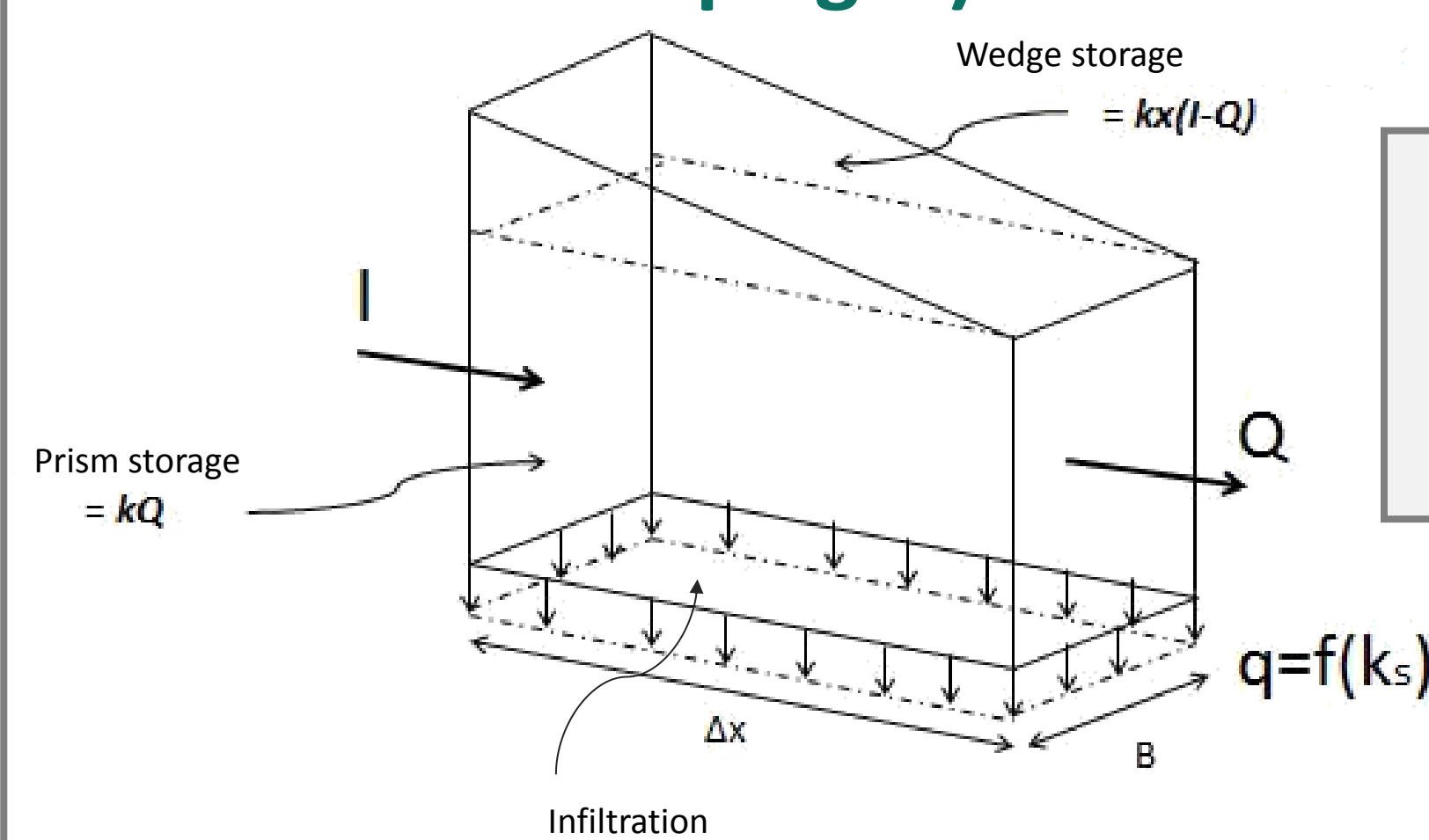
Hydrological variables



Statistics of the mean water volumes flowing along the ditch during the study period



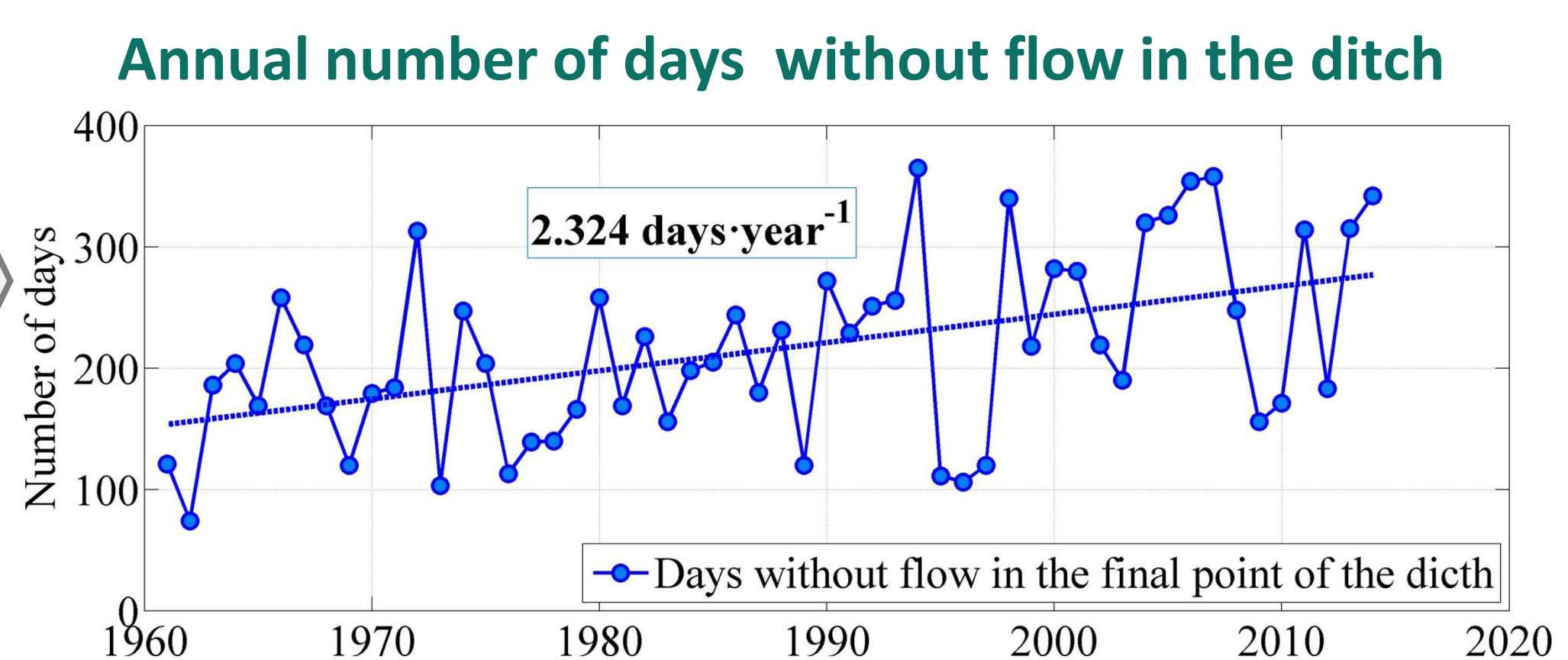
Hydraulic circulation model
(Hydrologic routing by Muskingum model + infiltration term, and field campaigns)



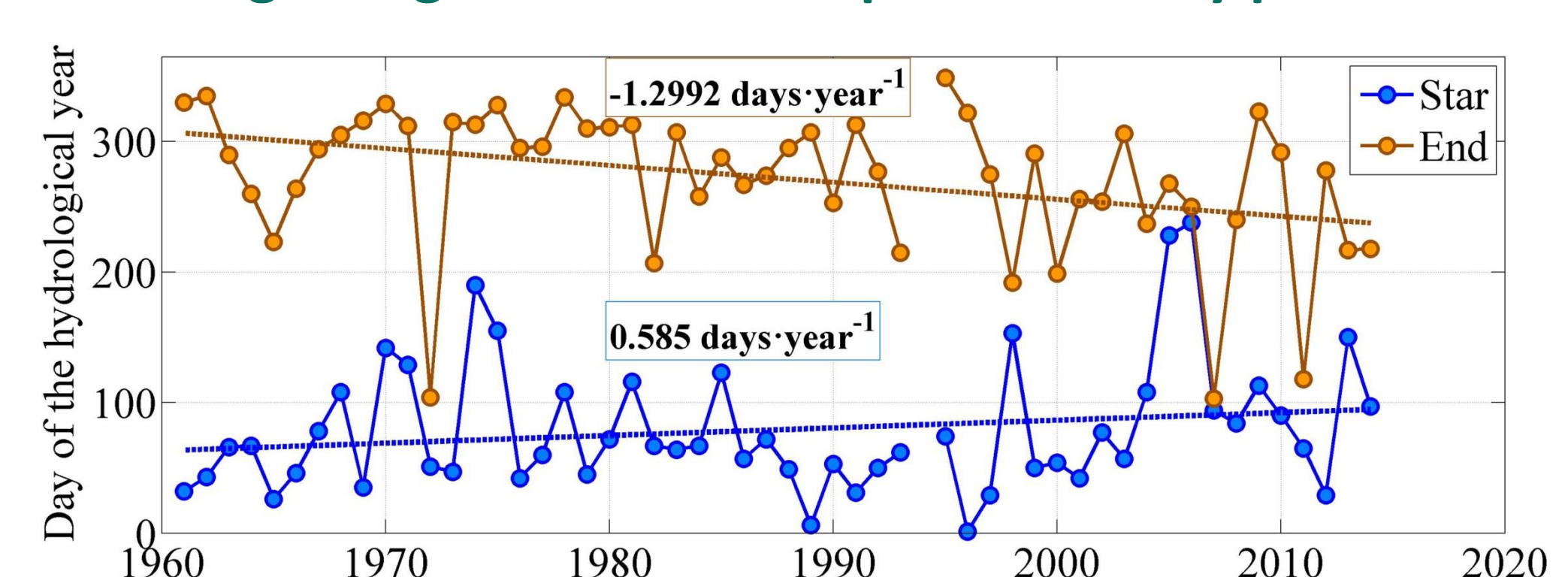
Flow routing along the ditch

INDICATORS

Combination of hydrological modelling of the contribution areas and flow routing along the ditch can generate some indicators of the flow regime along the ditch for users' assessment



Beginning of the ditch fill phase and dry phase



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